International Forum of Ocean Information 2020

Program Book

Organizer:

Harbin Engineering University

National Key Laboratory of Underwater Acoustic Science and Technology

Key Laboratory of Marine Information Acquisition and Security, Ministry of Industry and Information Technology

Heilongjiang Ocean Information Technology key Laboratory

April 10-11, 2020 Harbin, China

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Introduction of International Forum of Ocean Information 2020

I. ABOUT IFOI 2020

The International Forum of Ocean Information 2020 (IFOI 2020)，will be held on 10th-11th, April, 2020, at Harbin Engineering University in China. The goal of IFOI 2020 is to bring together experts in the field of Ocean Information to present the advanced technologies, and discuss their research achievements and experiences, and explore the future the research directions by the intersection and merging of different subjects.

II. TOPICS

- Underwater acoustics and acoustical oceanography
- Ocean observatories and ocean acoustic instruments, systems and platforms
- Ocean information sensor and Marine information platform
- Underwater communication and networking
- signal detection and estimation, target tracking and recognition
- Design, development, testing and calibrations for acoustical sensor and array
- Polar acoustics and under-ice propagation
- Underwater non-acoustic detection and communication
- Underwater acoustics in extreme and special environments: discovery, observation and application

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National Key Laboratory of Underwater Acoustic Science and Technology
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Chairman Desen Yang

Professor Desen Yang is an academician of the Chinese Academy of Engineering. He is a doctoral supervisor of Harbin Engineering University (Harbin). He used to be the vice-chancellor of Harbin Engineering University. Now he is serving as the vice-chairman of the Acoustical Society of China (ASC), the vice-chairman of National Science and Technology Terminology Accreditation Committee of Acoustics Science and Technology, the chairman of the Underwater Acoustic Technology National Defense Key Laboratory Academic Committee and etc.

In 1982, he got his bachelor's degree of underwater acoustic engineering in Harbin Shipbuilding Engineering Institute. He continued his study and received his master's degree of Underwater Acoustic Engineering at Harbin Engineering University in 1988. He got his doctor's degree in 1998. He has ever paid a visit to Woods Hole Oceanographic Institute as a visiting scholar for half a year in 1999. Prof. Yang has been devoting himself to develop the technology of underwater detection by vector sonar and the acoustic stealth technology. Also, he has been paying much attention on measuring underwater radiated noise, abstracting character of underwater targets, the recognition of various underwater targets, mechanism and forecast of underwater structure excited vibration and sound radiation and etc. Till now, he has already made quantities of outstanding achievement in the fields mentioned above. Also, he is endeavoring to develop a new technology which has been proved to be valid, to control underwater low-frequency noise with the help of nonlinear acoustic. Now, the new technology is in the stage of putting into use.

He and his scientific research group have won 2 State-class Technology Progress Minor Awards, a State-class Technology Progress Third Award and 13 provincial-level technology progress awards. He has published 2 academic monographs, 152 academic papers on high-level journals. 36 of his patents have been accepted by the state, while 15 of them have been authorized. He also won quantities of individual awards such as "Heliang&Heli" Technology Progress Award, "Ma Dayou" Acoustic Award, National Outstanding Innovation Individual Medal, National Outstanding Teaching Achievement Award and etc. Prof. Yang grants ever national allowance by State Council and he is also a national outstanding mid-aged expert.

FORUM INFORMATION

Organizers:

Harbin Engineering University (HEU)

National Key Laboratory of Underwater Acoustic Science and Technology

Key Laboratory of Marine Information Acquisition and Security, Ministry of Industry and Information Technology

Heilongjiang Ocean Information Technology key Laboratory

Chairman:

Desen Yang

Organizing Committee:

Jingwei Yin Gang Qiao Yang Song Tian Zhou Shengquan Wang

Yingzi Wu Guangpu Zhang Bo Hu Shiqi Mo Songzuo Liu Liangliang Liu

Shuai Shi Shi Jiang Ruilin Song Yu Meng

Section Chairs:

Ying Shen Songzuo Liu Yongyao Chen

Tian Zhou Shiqi Mo Xueli Sheng Cui-e Zheng

Online Meeting Software:

IFOI 2020 is an online meeting using ‘zhumu’ video conferencing software. All the attendances communicate with each other online. The participants need to install the software ’zhumu’ to attend the forum.

zhumu ID: 154 657 044

Submission of papers:

IFOI 2020 does not require the submission of papers.

International Forum of Ocean Information 2020 Program

Apr. 10, Friday			
Opening Ceremony			
Time	Activity	Host	Venue
08:30-08:45	Address by President Yu Yao of HEU Address by Prof. Desen Yang，Chairman of IFOI 2020	Gang Qiao	Harbin Engineering University

Session1: United States and Canada Chair: Ying Shen		
Time	Titles	Keynote
08:45-09:05	Polar acoustic detection and communication technology	Jingwei Yin
09:05-09:30	A MIMO communication system to enable the IoUT	Jean-François Bousquet
09:30-09:55	Data resolution improvement for ocean of things based on improved FCM	Houbing Song
09:55-10:20	Conducting acoustic surveys off the west coasts of the United States and Canada using Unmanned Surface Vehicle (Saildrone)	Dezhang Chu
10:20-10:45	Monte-Carlo integration models for multiple scattering based underwater optical wireless communication	Julian Cheng
10:45-11:10	High-speed and high-resolution silicon-tipped fiber-optic sensing platform for oceanography	Guigen Liu
11:10-11:35	Dual-core chalcogenide-PMMA taper and its sensing applications	Song Gao
11:35-11:40	Break	
Session2: Asia-Pacific Chair: Songzuo Liu		
11:40-12:05	Ocean remote sensing with high frequency surface wave radar- technical challenges and perspectives	Hongbo Sun
12:05-12:30	Artistic rendering and synthesis on GPU	Ping Li
12:30-12:55	Low-cost autonomous underwater vehicle for shallow water and structural health monitoring	Suleman Mazhar
12:55-13:20	Magneto inductive communication for underwater wireless sensor networks	Niaz Ahmed
13:20-13:45	Detection in mine hunting sonar	Can Emre BAKIM
13:45-14:10	Emerging technology NOMA for underwater acoustic communication	Naveed Ali Khan KAIM KHANI
14:10-14:15	Break	
Session3: Europe Chair: Yongyao Chen		
14:15-14:40	Study of low-frequency hydroacoustic waves behavior at the shelf of decreasing depth	Grigory Dolgikh
14:40-15:05	Edge resonance scattering in visco-elastic and inhomogeneous plates	Wenping Bi
15:05-15:30	The analysis of passive acoustic data from marine mammals: The challenge, some solutions and ways ahead	Paul White
15:30-15:55	Self-interference cancellation in Full-Duplex underwater acoustic systems	Yuriy Zakharov
15:55-16:20	Mobile edge computing to support augmented and virtual reality applications	Torsten Braun
16:20-16:45	New methods for the investigation of water layers from the surface to the deep sea	Stefan Marx
16:45-17:10	Coherent random fiber lasers for fiber sensing applications	Liang Zhang
17:10-17:35	Autonomous PAM tracking system on USV	ChiFang Chen

2020 海洋信息国际论坛日程

2020 年 4 月 11 日 Saturday		
主持人：周天　　主题：海洋信息系统技术		
时间	报告题目	报告人
08:40-09:00	以智慧海洋引领海洋信息技术创新发展	何元安
09:00-09:20	深度学习在水声信号处理中的应用研究	王方勇
09:20-09:40	水下小目标声 CT 成像技术	范威
09:40-10:00	空海跨域通信	商志刚
10:00-10:20	温盐深仪技术（CTD）与国产化现状	范寒柏
10:20-10:30	会休	
主持人：莫世奇　　主题：海洋信息对抗技术		
10:30-10:50	非高斯噪声条件下波束形成技术研究	李波
10:50-11:10	超磁致伸缩材料的无损检测与破坏分析	郭晶
11:10-11:30	从隐身计算到机器意识-AI 海洋应用模式的探索与实践	王念滨
11:30-11:50	多源水下目标探测与定位仿真集成平台技术初探	李丽洁
11:50-12:10	基于三轴隧穿磁强计立体阵列的磁梯度张量线性测距定位方法	黄玉
午休		
主持人：生雪莉 主题：海洋信息装备技术		
14:00-14:20	惯性组合导航技术研究	王秋滢
14:20-14:40	基于多平台光学遥感图像的海洋信息智能监测	宿南
14:40-15:00	武器装备评估技术与军事智能分析应用	凌焕章
15:00-15:20	高精度量子矢量磁力仪的研究	张军海
15:20-15:40	光纤海底地震计关键技术研究	苑勇贵
15:40-15:50	会休	
主持人：郑翠娥 主题：海洋信息通用技术		
15:50-16:10	水下爆炸模拟加载实验技术	曲嘉
16:10-16:30	基于声学通信与测距的水下多 AUV 协同定位优化方法研究	徐博
16:30-16:50	石油勘探与海洋声层析中的优化问题与正则化方法	蔡魁杰
16:50-17:10	波动方程反问题及其反演方法研究	冯国峰
17:10-17:30	海洋轻质声学复合材料	魏浩

Grigory Dolgikh

Grigory Dolgikh, Academician of the Russian Academy of Sciences; Deputy Chairman of the Far Eastern Branch, Director of the Pacific Ocean Institute of the Russian Academy of Sciences; Director of the Geophysics Institute; Associate Dean of the Natural Science college of the Russian Far Eastern Federal University, and the Head of the Department of Marine and Meteorological Hydrology of the Russian Far Eastern Federal University. Grigory Dolgikh has long been engaged in the study of the direction of geophysics and has achieved fruitful results in the generation and transformation of sub-acoustic oscillations. He has also conducted in-depth research on long-arm laser interferometry and has achieved the world-leading level. In the past five years, he has published more than 80 scientific papers and 8 patents.

《Study of low-frequency hydroacoustic waves behavior at the shelf of decreasing depth》

The study is based on the use of low-frequency hydroacoustic transmitters and coastal receiving systems of seismoacoustic signals. Use of coastal receiving systems of seismoacoustic signals, generated as a result of transformation of hydroacoustic signals at the "water-bottom" boundary, allows studying the structure and composition of the marine earth crust without large-scale destruction of ice cover, which makes the use of these methods more economical in comparison with traditional ones. Knowledge of these regularities is very relevant in the study of signals generated by natural and artificial marine objects, especially in low-frequency sound and infrasound ranges, and propagating from "deep" to "shallow" sea. The first similar work carried out with a low-frequency hydroacoustic transmitter, generating signals at a frequency of 33 Hz, made it possible to establish some regularities for this frequency range. However, the question remains: how do the regularities, identified in, transform, when the frequency of the transmitted signal is reduced? In this paper, we study some peculiarities of propagation and transformation of hydroacoustic signals at the frequency of 22 at the shelf of decreasing depth. As a result of experimental and model studies, the general regularities of propagation of low-frequency hydroacoustic waves at the shelf of decreasing depth and their transformation into seismoacoustic waves of the surface type at the "water-bottom" boundary are revealed.

Jingwei Yin

Jingwei Yin, the professor and Director of Scientific Research Institute at Harbin Engineering University (HEU), received his B.S, M.S, and Ph.D. degrees in underwater acoustic engineering from HEU, China in 1999, 2006, and 2007, respectively. As a member of Distinguished Young Scholar of Chang Jiang Scholars Program and winner of the Fok Ying Tung Education Foundation and Outstanding Youth Foundation of Heilongjiang Province, Prof. Yin serves as the deputy director of the underwater acoustic branch of the Acoustical Society of China, and a director of the Key Laboratory of Marine Information Acquisition and Security (Harbin Engineering University), Ministry of Industry and Information Technology. His research interests cover underwater acoustic engineering, underwater acoustic communication, and polar acoustics.

《Polar acoustic detection and communication technology》

China's Arctic Policy, the first white paper on the Arctic, makes it clear that China will become an active participant, builder and contributor in Arctic affairs. Polar pack ice makes underwater information access difficult and error prone. Polar acoustic technology becomes the only means of information acquisition and transmission under ice. Prof. Jingwei Yin and his team has paid close attention to polar acoustic science and technology since 2014. Arming at new challenges brought by polar marine environment, some pioneering work has been carried out in terms of understanding and modeling of under-ice sound field, ice thickness measurement, under-ice & cross-ice detection and communication.

Some valuable conclusions have been proved in Songhua River, Bohai Bay area， Vladivostok Sea Ice Area (Russian), and by the eighth and ninth Chinese Arctic Research Expedition’s experiments data. The achievement is valuable for the development of the informationization and modernization of the polar region.

Paul White

Paul White, is the Professor of Statistical Signal Processing at the Institute of Sound and Vibration Research (ISVR) at the University of Southampton; he is also a Guest Professor at Harbin Engineering University. He has been at the ISVR for over 30 years and served as its director for 6 years, from 2013-9. His major research interests are in the field of signal processing and underwater acoustics. He has published more than 100 papers in peer reviewed journals and has a total of about 400 publications in all.

《The Analysis of Passive Acoustic Data from Marine Mammals: The Challenge, Some Solutions and Ways Ahead》

The vocalisations of marine mammals vary greatly in their nature: from the low frequency moans of the large baleen whales (e.g. blue whales and fin whales), through the complex songs of humpback whales, the whistle and clicks of dolphins to the high frequency echolocation clicks of porpoises. Passive acoustics provides a vital tool for studying these animals; these methods are being more widely used because of the growing availability of long-term acoustic recorders, whose capacity is ever increasing, meaning bigger and bigger data sets are being gathered. Traditionally, such acoustic data would be analysed manual, looking at spectrograms and listening to recordings, but the size of datasets now collected means that some degree of automation of the processing is a necessity. This discussion will select a few specific challenges found in this context, problems including the detection and localisation of sperm whale and fin whales using bottom mounted sensors, detection and tracking of dolphin whistles and the separation of calls of humpback whales.

Dezhang Chu

Dezhang Chu, received the Bachelor's degree in Electric Engineering from the China University of Geosciences (Wuhan) in 1982, and Ph.D in Geophysics from the University of Wisconsin-Madison in 1989. He has been working in the area of underwater acoustics, acoustical oceanography, and fisheries acoustics for over 30 years. He worked at the Woods Hole Oceanographic Institution from 1989 to 2007 and moved to the NOAA Fisheries Northwest Fisheries Science Center in 2007. In recent years Dr. Chu has focused on applying the advanced technologies, including broadband technologies and unmanned marine vehicles (UMS), to fisheries acoustic surveys.

《Conducting acoustic surveys off the west coasts of the United States and Canada using Unmanned Surface Vehicle (Saildrone)》

The Generation-5 Saildrones were equipped with a Simrad EK80 Wide Band Transceiver (WBT) and a Mini-Combi (38 and 200 kHz) transducer. A pulse duration of 1024 μs was used for both frequencies and data were recorded to 600 m below the surface. Before the surveys, all USV echosounders were calibrated in an indoor tank at SWFSC (San Diego, CA) in 2018 and on the docksite at the Saildrone, Inc (Alameda, CA) in 2019. In addition to the collection of acoustic data, the USVs also collected weather and oceanographic data. All USVs were operated by technicians/engineers (operators) at Saildrone, Inc. Communication between scientists and the operators was via an internet portal where mission log, oceanographic data, and low-resolution acoustic data were available in near real-time. The final high-resolution acoustic data were saved on a storage device onboard the USVs and could be retrieved after the USVs were recovered. The performance of the USVs on navigation, operation, and the quality of acoustic data was analyzed and evaluated. The potential applications of using USVs on conducting quantitative ecosystem acoustic surveys will be discussed.

Yuriy Zakharov

Yuriy Zakharov, received the M.Sc. and Ph.D. degrees in electrical engineering from the Power Engineering Institute, Moscow, Russia, in 1977 and 1983, respectively. From 1977 to 1983, he was with the Special Design Agency in the Moscow Power Engineering Institute. From 1983 to 1999, he was with the N. N. Andreev Acoustics Institute, Moscow. From 1994 to 1999, he was with Nortel as a DSP Group Leader. Since 1999, he has been with the Communication Technologies Research Group, Department of Electronic Engineering, University of York, U.K., where he is currently a Reader. His research interests include signal processing, communications, and underwater acoustics.

《Self-interference cancellation in full-duplex underwater acoustic systems》

Underwater acoustic (UWA) communication suffers from the limited available bandwidth for data transmission. Full-duplex (FD) operation can double the spectral efficiency in UWA communications. Sonar systems would also benefit from the FD operation, by expanding the family of sonar waveforms. There is a significant potential in adopting the FD in UWA systems. The major obstacle in FD is the severe self-interference (SI) introduced by the near-end transmission. For UWA systems, due to relatively low signal frequencies, high-resolution analog-to-digital converters are available. Therefore, it is possible to achieve high SI cancellation (SIC) using digital signal processing. In this talk, we present results of our research on digital SIC in FD UWA systems within the EPSRC (EP/R003297/1) project “Full-Duplex for Underwater Acoustic Communications”. We first show a SIC scheme where the power amplifier nonlinearity does not affect the cancellation performance. We also discuss how the sampling of transmit and receive signals influence the performance and present an improved SIC scheme. We then discuss how fast SI channel variations affect the SIC performance and present two solutions. The first is based on adaptive beamforming with two receivers. The second is based on new adaptive filters that allow improved tracking performance. The results presented have been obtained via simulation (using Waymark simulator), as well as water tank and lake experiments.

Can Emre BAKIM

Can Emre BAKIM, has been working as the president of ARMELSAN Defence Technologies which is a sonar design and production company in Turkey since November 2018. He started working as a design engineer in sonar projects in 2007 and involved in various underwater acoustics projects (ASW sonar systems, Diver Detection Sonar, Torpedo Homing Head, Underwater Communication etc.) with different roles and titles since then. He both has Master of Science and Master of Business Administration degrees from Middle East Technical University and Bilkent University.

《Detection in mine hunting sonar》

Naval mines can be used strategically, channeling or denying passage through restricted waters and in and out of ports needed for sustenance by littoral nations. With the help of wide band transducer technology; indigeniously developed Mine Hunting Sonar (NUSRAT-1915) can detect moored mines, bottom mines and mine like objects from longer distances.

Torsten Braun

Torsten Braun, received the Ph.D. degree from the University of Karlsruhe, Karlsruhe, Germany, in 1993, From 1994 to 1995, he was a Guest Scientist with INRIA Sophia-Antipolis, France. From 1995 to 1997, he worked with the IBM European Networking Centre Heidelberg, Heidelberg, Germany, as a Project Leader and a Senior Consultant. Since 1998, he has been a Full Professor of computer science with the University of Bern, Bern, Switzerland. He was the Director of the Institute of Computer Science and Applied Mathematics, University of Bern, from 2007 to 2011. He was the Vice President of the SWITCH (Swiss Research and Education Network Provider) Foundation from 2011 to 2019. He also served as the Deputy Dean of the Faculty of Science, University of Bern, from 2017 to 2019.,Dr. Braun was the recipient of the Best Paper Award from IEEE Conference on Local Computer Networks 2001, International Conference on Wired/Wireless Internet Communications 2007, Conference on Energy Efficiency in Large Scale Distributed Systems 2013, IFIP Wireless and Mobile Networking Conference 2014, and the Workshop on Adaptive Resource Management and Scheduling for Cloud Computing 2014 as well as the GI-KuVS Communications Software Award in 2009. (Based on document published on 12 September 2019). Show Less.

《Mobile edge computing to support augmented and virtual reality applications》

Augmented and Virtual Reality applications (AR/VR) have a huge potential in future education and other application areas. Those applications have strong requirements on throughput, reliability, and delay. Mobile telecommunication networks will be based on softwarization concepts and due to the above mentioned AR/VR requirements, functionality will be provided by edge servers following the concept of Mobile Edge Computing aka Multi-access Edge Computing. We will discuss several use cases for MEC, e.g., proactive content prefetching in vehicular networks, adaptive video streaming over wireless networks, and indoor positioning.

Jean-François Bousquet

Jean-François Bousquet, Jean-François Bousquet joined Dalhousie University in July 2013 and is currently Department Head in Electrical and Computer Engineering. His research interests are communication systems, software defined modems and digital signal processing on field programmable gate arrays. Most of his recent work is applied to ocean technology, and particularly towards experimentation in the field of underwater sensor networks. He is a graduate of École Polytechnique de Montréal where he completed his B. Eng. in Electrical Engineering in 2001. He also completed his M.Sc. and Ph.D. degree in Electrical Engineering at the University of Calgary in 2007 and 2011 respectively, where he focused on the implementation of low-power integrated circuits applied to wireless communications. Between 2009 and 2011, he was employed as a high-speed analog IC designer at Ciena for the development of coherent fibre optics communication networks. Since he joined Dalhousie, he has applied his expertise towards a new and exciting application: underwater communications.

《A MIMO communication system to enable the IoUT》

As there is a significant demand to monitor infrastructures deployed at sea, the Internet of Underwater Things (IoUT) promises to connect various sensors deployed below the sea surface. For this purpose, software-defined modems (SDMs) are highly desirable, because the transmitter and receiver parameters can be adjusted automatically, depending on the propagation conditions. In this work, an SDM relying on a 2-element transmitter is designed and characterized in shallow water sea conditions. The transmitter front-end is designed to enable a 5-km link, and in this work, it will be demonstrated using realistic software channel models that a reliable communication link can be achieved for a throughput as high as 10 kbps.

Qifang Chen

Chi-Fang Chen, received her Ph.D. in the Department of Ocean Engineering, Massachusetts Institute of Technology in 1991, and started her career as the faculty member of the Department of Naval Architecture of National Taiwan University from 1991 till now. (Department of Naval Architecture was renamed as Department of Engineering Science and Ocean Engineering in 2000). Her research expertise and interests are underwater acoustics and underwater acoustic propagation. She is 0conducting passive acoustic monitoring (PAM) in recognizing sounds from different species in the ocean which includes Sousa chinensis- in Taiwan waters. She also has interests in autonomous ocean sensing, and has supervised two master's theses in AUV, and is now supervising five graduate students in autonomous surface vehicle study. Her goal in the near future is to establish a PAM network in the west coast of Taiwan to monitor the endangered species, namely the Chinese White Dolphin (Sousa chinensis), and other marine lives. The PAM network is a major component in the integrated dolphin monitoring network, and is composed of fixed stations (bottom-mounted, moored hydrophones, or sonobuoys) and mobile platforms with acoustic payloads such as ASVs.

《Autonomous PAM tracking system on USV》

The protected area of the Sousa chinensis (also called Indo-Pacific Humpback Dolphin or Chinese White Dolphin), an endangered species in Taiwan waters, are close to the developing offshore wind farms in the coastal regions west of Taiwan. Concerns about the wellbeing of these marine mammals are overwhelming, and their whereabouts become an urging issue. Passive acoustic monitoring is a key technique in finding their whereabouts based on detections of whistles and clicks made by the animals. This paper demonstrates using unmanned surface vehicle with hydrophones to detect, classify, localize, and track the sound sources. This process has four main parts, including real-time dolphin whistle detection, real-time shore side monitoring system, underwater acoustic source localization and source tracking behavior of the surface vehicle. This work aims at application is to track the dolphins in the coastal waters.5

Guigen Liu

Guigen Liu, joined Harvard University as a research fellow in January 2020, where he is leading the development of fiber-optic imaging systems for biomedical applications. Prior to the current position, he was a postdoc research associate with Prof. Ming Han's group, first at University of Nebraska-Lincoln since April 2014 and then at Michigan State University since February 2018. He has published extensively on optical fiber sensing with a focus on temperature, flow, radiation, and ultrasound monitoring in the last few years. His pioneering work on silicon based optical fiber sensing platform opens up a new paradigm of high-speed and high-resolution measurement. The successful demonstration of a silicon-tipped temperature sensor in oceanographic settings received the 2015 Alan Berman Research Publication Award at the U.S. Naval Research Laboratory. His recent work on surface-bonded fiber-optic ultrasound sensors lays the first comprehensive theoretical framework, which quantitatively explains the previous experimental phenomena not well known before. He received the B.E. degree from Qingdao University in 2008, and the Ph.D. degree from Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP), Chinese Academy of Sciences in 2013, all in mechanical engineering. He was appointed as an Assistant Professor with CIOMP upon graduation.

《High-speed and high-resolution silicon-tipped fiber-optic sensing platform for oceanography》

Oceanographers are being challenged by problems associated with the ubiquitous optical turbulence in clean open waters, such as the blurring of underwater imaging. Besides salinity that leads to the optical turbulence, other contributing factors include the temperature and flow microstructures in the water. Underwater sensors which provide high-speed and high-resolution measurement of these water temperature and flow profiles are thus urgently called for by related oceanography experts. In this talk, a pioneering kind of optical fiber sensing platform will be discussed. These sensors are constructed using a single-crystal silicon Fabry-Perot interferometer attached to the tip of a single-mode fiber. The large thermo-optic coefficient and thermal diffusivity of crystalline silicon, along with the miniature footprint enabled by the mature MEMS fabrication techniques, render the speed and resolution not achievable by other fiber-optic counterparts. Techniques to reduce the noise level and increase the dynamic range will also be demonstrated. Some field measurements performed by a patented prototype will be presented to demonstrate the promise.

Julian Cheng

Julian Cheng, received Ph.D degree in electrical engineering from University of Alberta, Edmonton, AB, Canada. He is currently a Full Professor in the School of Engineering, Faculty of Applied Science, at The University of British Columbia (Okanagan campus) in Kelowna, BC, Canada. His current research interests include wireless communication theory, wireless networks, optical wireless communications, and quantum communications. Dr. Cheng has served as a member of technical program committee for many IEEE conferences and workshops. He now volunteers as an Area Editor for IEEE Transactions on Communications. In the past, he served as an Associate Editor for IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, IEEE Communications Letters, and IEEE Access, and was a past Guest Editor for a special issue of IEEE Journal on Selected Areas in Communications on optical wireless communications. Currently, he serves as the President of the Canadian Society of Information Theory as well as the Secretary of IEEE Radio Communication Technical Committee within the IEEE Communication Society.

《Monte-Carlo Integration Models for Multiple Scattering Based Underwater Optical Wireless Communication》

Monte-Carlo models are analyzed for multiple scattering channels in underwater optical wireless communications. It is demonstrated that the system impulse response function can be obtained by Monte-Carlo integration model. The convergence performance for the Monte-Carlo integration model is analyzed and improved by introducing different sampling methods. Numerical simulation suggests that for a three-order scattering case, the computation efficiency of the Monte-Carlo integration model based on partial importance sampling is about 12 times of the original Monte-Carlo integration model based on uniform sampling, and 5.6 times of the widely used Monte-Carlo simulation model.

Hongbo Sun

Hongbo Sun, received his B.Eng. and Ph.D. degrees from Nanjing University of Science and Technology, China, in 1997 and 2002, respectively. He joined the School of Electrical and Electronic Engineering, Nanyang Technological University (NTU), Singapore, in 2002, as a Research Fellow. Between July 2004 and Oct 2019, he was with Temasek Laboratories at NTU as Research Scientist (2004-2008), Senior Research Scientist (2008-2019), Principal Investigator (2010-2019), and Programme Manager (2019). Since Oct 2019, he has been with Institute for Infocomm Research, Agency for Science, Technology and Research (A*STAR), Singapore, as a Senior Scientist. He has engaged in the R&D on advanced signal processing for radar and RF sensing applications for more than 20 years. He has authored/co-authored two book chapters and more than 80 technical papers in refereed journals and conference proceedings. He is the Senior Member of IEEE and was the past Chair of IEEE AES/GRS Joint Singapore Chapter. He is also serving as the Associate Editor / Guest Associate Editor for research journals Electronics Letters and IEEE Geoscience and Remote Sensing Letter. Previously he had ever been the Technical Program Committee Co-chair in APSAR 2015 and the Technical Program Committee member in many other international conferences. He was also the recipient of Excellent Paper Award in RADAR 2006 conference. Since 2020, he has been appointed as the IEEE AESS Distinguished Lecturer.

《Ocean Remote Sensing with High Frequency Surface Wave Radar- Technical Challenges and Perspectives》

Aided by the good conductivity of ocean water with respect to the vertically polarized electromagnetic wave in high frequency band (3-30MHz), the High Frequency Surface Wave Radar (HFSWR) can capture the echo signals from ocean surface beyond the line-of-sight limitation via surface-wave propagation mode and, consequently, has the potential to be an economical sensor for wide-area coastal surveillance and remote sensing in the 200 nautical miles Exclusive Economic Zone (EEZ). More specifically, the ocean current velocity/direction, wave height, and wind field information can be robustly derived from the Doppler spectrum of HFSWR echoes, which can provide many useful information for the marine environmental monitoring. However, the HFSWR is also facing some technical challenges such as the system size/cost, external interferences (e.g., radio frequency interference, ionospheric clutter, and lightning), and limited accuracy/resolution, etc. In this talk, the system architecture and principles of HFSWR for ocean remote sensing are introduced first. Then the technical challenges faced by the HFSWR are analyzed in details and the respective solutions are addressed. Finally, the future development of advanced HFSWR system is discussed.

Wenping Bi

Wenping Bi, received his Ph.D degree from Le Mans University, France in 2004. He is currently is an associate professor with the Laboratory of Acoustics of Le mans University. He has conducted a series of industrial projects in collaboration with AIRBUS and SNECMA in the reductions of noise and fundamental projects supported by ANR and LMAc. His current research interests include sound propagation and scattering in elastic, visco-elastic, inhomogeneous and anisotropic waveguides.

《Edge resonance scattering in visco-elastic and inhomogeneous plates》

Free edges (e.g., cracks), dissipation and inhomogeneities are important material properties in elastic ice sheets and marine sediment. Lamb wave propagation in infinite, visco-elastic and inhomogeneous plates and scattering from free edges have not been well understood. Other important applications of Lamb waves include non-destructive inspections in aircraft wings and underwater submarine hulls, and damping of unwanted vibrations, etc.. It has been found that a mode, with a real resonance frequency (eigenvalue), is localized at the free edge x=0 of a semi-infinite plate, say $x \geq 0$, $-h \leq y \leq h$, and $-\infty < z < \infty$, although the plate is open in +x direction, when the Poisson's ratio is equal to 0 (Roitberg etc. Q. J. Mech Appl Math 1998) and 0.2448 (Pagneux JASA 2006 and Zernov etc. PRS London 2006). For any other poisson's ratio, the localized mode turn to be a leaky mode with complex resonance frequency whose imaginary part represents the decaying rate. When the lowest order symmetric mode S0 is incident from $x=\infty$, resonance scattering at the edge takes place. Large amplitudes of symmetric S1 and S2 modes will be excited (Torvik JASA1967). A comprehensive overview was provided by Lawrie and Kaplunov (MMS2011).

In this presentation, we first demonstrate total absorption in a visco-elastic semi-infinite plate by means of critical coupling with edge resonance. We show that by adding a small part of loss in the elastic plate, total absorption can be achieved. We present realistic examples to realize the total absorption. This result would have many practical applications in the reduction of noise.

We present also the effects of inhomogeneities on the edge resonance scattering. We found that a Fano resonance occurs due to the excitation of the leaky mode when A0 is incident. This Fano resonance is formed by the interference between A0 mode and the leaky mode. It is very sensitive to the propagation paths and should have potential applications in noise reduction and acoustic propagation and target tracking in ice- covered Arctic environment.

Suleman Mazhar

Suleman Mazhar, received his B.S. degree in Computer Science NUCES-FAST University, Lahore, Pakistan, the M.S. degree in Computer Simulation & Modeling from GIK Institute of Engineering Science & Technology, Topi, Pakistan, in 2003 and 2005, respectively, and the Ph.D. degree in underwater acoustics from the University of Tokyo, Japan in 2009. He worked as NIH-funded postdoctoral fellow at Georgetown University, Washington DC, USA. Later he joined as faculty member at Faculty of Computer Science & Engineering at GIK Institute Pakistan. He was the director of Laboratory for Bio-inspired Simulation & Modeling of intelligent Life (BiSMiL Lab) at Information Technology University, Pakistan before joining as professor at Harbin Engineering University. He is an active researcher in the field of bioacoustics and deep learning. He has published papers in prestigious venues such as IEEE PERCOM, VTC, Oceans and has won grants over 20 million PKR to work on themes related to ICT4D and conservation of Indus River dolphin. Currently, he is managing Pak-DAAD grant for intelligent autonomy for low-cost vehicles and a project on ICT based monitoring of endangered Indus River dolphin in Pakistan. His research interests include underwater robotics and communication, bioacoustics, machine learning and embedded systems.

《Low-cost autonomous underwater vehicle for shallow water and structural health monitoring》

Use of existing underwater technology is restricted to high-end classified and military applications. However, it is necessary to develop use-cases for ubiquitous low-cost application of these technologies. In this context, a solution for low-cost autonomous underwater vehicle is presented that can be used for water quality monitoring in shallow freshwaters. Moreover, a case for underwater image processing for structural health monitoring is proposed using low-cost camera. The vehicle is a hovering-type AUV with a length of 0.43 m, and a radius of 0.09 m with a depth rating of 4m. Multiple sensors have been installed onboard the AUV for monitoring water quality parameters including pH, turbidity, total dissolved solids, temperature, and electrical conductivity. A 9-DOF IMU, GY-85, is used, which incorporates an accelerometer, a gyroscope, and a magnetometer. The readings from these three sensors are fused together using direction cosine matrix algorithm, providing the AUV with the roll, pitch and yaw angles. Underwater image processing research work is based on unsupervised approach for crack detection in underwater concrete structures. It is based on local feature clustering using K-Medians on Haralick texture features. An additional step for outliers removal is introduced, based on a bimodal Gaussian distribution for candidate blocks. This approach has been successfully tested on a dataset of 490 images, with quantitative results produced for a subset of 40 random images in the dataset. In future, we plan to explore implementation of proposed image processing algorithms to AUV platform for real-time low-cost structural monitoring.

Stefan Marx

Stefan Marx, Graduate Physicist. After completing a postgraduate degree in Applied Physics at the University of Kiel, he has worked on several R&D and industrial projects in leading roles. He has 27 years of experience working for advanced technology companies both locally and internationally performing Stefan has developed the first autonomous deep-sea profiler during his career at the University of Kiel. While working in HZG Research Centre, he has taken responsibility for the offshore marine monitoring networks including sensor equipments in number of EU projects. Through his employment as a senior project leader, he has developed the European "FerryBox" underway system. He has focussed his scientific and industrial interest on the production of power solutions, CO2 analyzers and vessel systems to monitor environmental issues. Being a maritime expert, he has extensive experience working as a consultant within European public organisations, for numerous companies and institutes, and for offshore oil+gas companies. In 2013, Stefan Marx was honoured with the German-France Economic Award among Daimler, Renault and others in Paris.Today, his company SubCtech, founded in 2010, is a leader in ship underway systems and innovative Li-ion battery systems.

《New methods for the investigation of water layers from the surface to the deep sea》

Due to the huge expanse of the sea, both in terms of area and depth, special methods for investigation or mapping are necessary. SubCtech has therefore developed both measuring systems for ships to investigate the surface and systems for the deep sea. The peculiarity of ship measurement systems lies in the automatic unattended operation for recording all possible parameters from mostly any sensor or analyzer. The same sensors and telemetrics can mostly also be used in the deep sea, but the "socket" is missing here. SubCtech has therefore also developed batteries for the deep sea, which can supply large stations (also for offshore oil+gas), as well as probes or vehicles such as AUVs or ROVs.

Houbing Song

Houbing Song, Houbing Song(M'12–SM'14)received the Ph.D. degree in electrical engineering from the University of Virginia, Charlottesville, VA, in August 2012, and the M.S. degree in civil engineering from the University of Texas, El Paso, TX, in December 2006. In August 2017, he joined the Department of Electrical Engineering & Computer Science, Embry-Riddle Aeronautical University, Daytona Beach,FL, where he is currently an Assistant Professor and the Director of the Security and Optimization for Networked Globe Laboratory (SONG Lab, www.SONGLab.us). He served on the faculty of West Virginia University from August 2012 to August 2017. In 2007 he was an Engineering Research Associate with the Texas A&M Transportation Institute. He has served as an Associate Technical Editor for IEEE Communications Magazine (2017-present), an Associate Editor for IEEE Internet of Things Journal (2020-present) and a Guest Editor for J-SAC, IEEE Internet of Things Journal, IEEE Transactions on Industrial Informatics, IEEE Sensors Journal, IEEE Transactions on Intelligent Transportation Systems, and IEEE Network. He is the editor of six books. He is the author of more than 100 articles. His research interests include cyber-physical systems, cybersecurity and privacy, internet of things, edge computing, AI/machine learning, big data analytics, unmanned aircraft systems, connected vehicle, smart and connected health, and wireless communications and networking.

《Data resolution improvement for ocean of things based on improved FCM》

In Ocean of Things, information prediction is an important part of marine data processing. Due to a variety of marine acquisition devices, the distribution of marine information is discrete. The marine area is wide, and the resolution of the collected data is small, which causes the IoT device to accurately calculate the information of a small sea area. Processing discrete and sparse data is the main job of marine information processing equipment. The main purpose of this paper is to predict the information of the blind area based on the collected data. In order to increase the resolution of sea surface information, the availability of marine data in the Internet of Things is improved. This paper proposes a method for predicting information on marine blind spots. This method is based on the improved machine learning algorithm FCM. This method is used to predict sea surface temperature and improve the resolution of sea surface data. Finally, this paper has done a number of simulation experiments, based on different methods to predict the sea surface temperature. The experimental results are discussed and the performance of the proposed method is analyzed.

Niaz Ahmed

Niaz Ahmed, received his B.S. degree in telecommunication engineering from NUCES-FAST University, Islamabad, Pakistan, the M.S. degree in computer engineering from CASE University, Islamabad, Pakistan, in 2010 and 2012, respectively, and the Ph.D. degree in electrical engineering from Missouri University of Science and Technology, Rolla, MO, USA, in 2017. He is one of the pioneers in the field of Magneto Inductive communication for underwater wireless sensor networks. He has published articles in reputed and prestigious journals and international conferences. He is also being selected in the OES student poster competition for two consecutive times. He is currently an Associate Professor in Harbin Engineering University, Harbin, China. His research interests include wireless communication, underwater wireless sensor network, magneto-inductive communication and embedded systems.

《Magneto inductive communication for underwater wireless sensor networks》

During the recent years, Magneto-Inductive (MI) communication has been actively studied for underwater wireless communications, thanks to its applications in sensor network and internet of underwater things. In comparison to acoustic and optical communication means, due to the same penetration of MI in water and air because of the similar magnetic permeability of both mediums. Magneto-Inductive (MI) systems are best suited for underwater wireless sensor networks applications with short range, high-data-rate and low power consumption. MI communication has the unique advantage of being small form factor, low cost, low power, low propagation delay, no multipath, and operational in air, underwater, and underground. Therefore, MI communication can play an important role in applications that involve complex environment, such as river, lake, wet land, farm field, and caves.

Ping Li

Ping Li, is currently a Research Assistant Professor with the Department of Computing, The Hong Kong Polytechnic University, Kowloon, Hong Kong. Prior to that, he was an Assistant Professor at the Macau University of Science and Technology, Taipa, Macau, and a Lecturer at The Education University of Hong Kong, Tai Po, Hong Kong. Dr. Li received his Ph.D. degree from The Chinese University of Hong Kong, Shatin, Hong Kong. He has published over 100 top-tier graphics and visualization papers refereed, including IEEE TVCG, TIP, TCSVT, TCYB, TBME, TSMC, TII, ACM SIGGRAPH VRCAI. He has an excellent Creative Media project reported worldwide by Science News Line, ScienceWeek, Science Bulletin, EurekAlert!, ACM TechNews, etc. His current research interests are computer graphics and creative media, including image/video stylization, colorization, artistic rendering and synthesis, computational art, interactive design, big data visualization, human-computer interaction, 2D/3D animation, GPU acceleration, virtual and augmented reality.r interaction, 2D/3D animation, GPU acceleration, virtual and augmented reality.

《Artistic rendering and synthesis on GPU》

Computational art synthesis as an expressive way for producing user-desired appearances has received much attention in creative media researches. In interactive design, it would be powerful to re-render the stylized presentation of interested objects virtually using computer-aided design tools for artistic effects generation and synthesis. However, the existing stylization and painterly rendering methods focused on artistic restyling directly in the field of RGB space considering little for the detailed salient structures of the input images, which unavoidably results in salience information loss. In this talk, we focused the structure-aware computational art synthesis on efficient stylization and face sketch synthesis. We present a real-time abstract stylization that preserves the fine structure in the original images using gradient optimization. We propose the image structure map to naturally distill the fine structure of the original images. Gradient-based tangent generation and tangent-guided morphology are applied to build the structure map. We facilitate the final stylization via parallel bilateral grids and structure-aware stylizing in real time. Further, we present a face sketch synthesis via deep neural network feature maps guided optimization. Our results accurately capture the sketch drawing style and make full use of the whole stylistic information hidden in the training dataset. We utilize the Enhanced 3D PatchMatch and cross-layer cost aggregation to obtain the target feature maps for the final sketches. In the experiments, our approaches consistently demonstrate high-quality performance of structure-aware artistic synthesis via GPU parallelism. In the future, we will further extend the artistic rending and synthesis to more complicated video applications with large motion and occluded scene avoiding stylized pixel flicking. We will also work on special effects synthesis by the inspiration of latest intrinsic image/video decomposition techniques.

Naveed Ali Khan KAIM KHANI

Naveed Ali Khan KAIM KHANI, obtained bachelor degree in Electronics Engineering from Sir Syed University of Engineering and Technology, Karachi, Pakistan, Masters of Science in Computer and Communication Networks from Telecom & Management SudParis (ex INT), Evry, France and the PhD degree in Communication and Information Systems from School of information and communication engineering, Dalian University of Technology, Dalian, China. He has worked as Lecturer & Head of Computer Network department from 2007 to 2009 at Universities of Engineering Science and Technology Pakistan (UESTP-France), Karachi, Pakistan and also worked as Assistant Professor from 2009 to 2011 at COMSATS Institute of Information Technology, Abbottabad, Pakistan. Currently, He is working as associate professor and Acting DEAN at Electrical Engineering department of Federal Urdu University Arts, Science and Technology, Islamabad, Pakistan. His main research areas: Wireless Communication, Wireless Sensor & Adhoc network and Underwater Communication. He is am also serving as a reviewer for many international journals of IEEE, Elsevier and Springer.

《Emerging technology NOMA for underwater acoustic communication》

Emerging communication technology is aspired at succeeding to reduce bandwidth limitation and higher data rate transmission. While, the prime limitation of Underwater Acoustic communication (UWA) is spectral resource limitations. Therefore, UWA can use the benefit of emerging communication technology such as radio access techniques to improve the spectral efficiency. One of the most promising radio access techniques is known as NOMA in emerging communication. While, compared to conventional de-facto standard radio access techniques like FDMA, TDMA, and OFDMA, The NOMA has desirable advantage potency, for instance, massive device connectivity, increased spectral efficiency and minimize the latency with better reliability. The existing NOMA scheme can generically be parted into two main classes, e.g, Code- NOMA and Power-NOMA. Furthermore, researcher has proven the overall performance improvement by integrating NOMA with various Wireless Communication techniques for instance Multi user (MU) - multiple-input multiple-output (MIMO), Beamforming, V-BLAST, space–time coding, network coding, Co-frequency and Co-time full duplex (CCFD), Cooperative communications, etc. Contemporary research studies shows that NOMA scheme has the potency to be applied in numerous UWA scenarios, such as, The Internet of Underwater things (IoUT), Autonomous Underwater Vehicle (AUV) and Underwater Sensor M2M communications.

Song Gao

Song Gao, received his Ph.D. degree in photonics from University of Ottawa, Ottawa, in 2019 and is currently a Postdoctoral Fellow in physics from the Department of Physics, University of Ottawa, Ottawa, Canada. His research interests include Brillouin random fiber lasers, design and fabrication of tapered chalcogenide-PMMA fiber and its applications, distributed fiber sensors, and design phase-shifted FBGs and chirped FBGs. He is the author of more than 20 refereed journal publications including 10 publications as a first author.

《Dual-core chalcogenide-PMMA taper and its sensing applications》

Fiber optical sensors have been extensively investigated for applications in the civil structures and ocean environment to ensure safety and prevent disasters in advance, which requires high sensitivity and high response speed. For example, water temperature is one of the most basic parameters in marine study and is related to many environmental factors. The ocean water mass boundaries are superimposed with each other and different layers have a temperature gradient, which leads to the requirements of a sensor with high sensitivity. Most of the demonstrated fiber sensors are based on the silica fibers by measuring the spectrum wavelength shift caused by the change of the refractive index and fiber length, and the sensitivities are limited by the small values of thermal-expansion coefficient and thermo-optic effect of the silica materials. To improve the sensitivity, we designed the tapered dual-core As2Se3-PMMA fiber with the PMMA cladding diameter 56.5 times larger than that of the As2Se3 cores, which brings out many interesting sensing applications.

Liang Zhang

Liang Zhang, received the B.S. degree and the Ph.D. degree from Shanghai Jiao Tong University, Shanghai, in 2009 and 2016, respectively. From 2013 to 2014, he joined the Group of Fiber Optics in École Polytechnique Fédérale de Lausanne (EPFL, Switzerland) as a visiting PhD under the supervision of Prof. Luc Thévenaz. From 2016 to 2019, he has been a full-time Postdoctoral Fellow in the Department of Physics, University of Ottawa (Canada) under the supervision of Prof. Xiaoyi Bao. Dr. Zhang is author or co-author of over 50 papers in peer-reviewed journals and international conference proceedings. Currently, he joins the Shanghai University, and his interests involve nonlinear fiber optics, fiber laser and optical fiber sensing.

《Coherent random fiber lasers for fiber sensing applications》

Random fiber lasers (RFLs) has been widely demonstrated by incorporating one-dimensional random feedback of distributed Rayleigh scattering from refractive index inhomogeneity in silica fiber instead of conventional mirror. As a new breed of laser, coherent random fiber lasers with unique spectral dynamic and noise properties have shown immense potentials in underlying fundamental research as well as practical applications such as fiber optics communication and fiber sensing. In this talk, recent advances in coherent random fiber laser as well as its fiber optic sensing for acoustic and ultrasound wave detection will be presented and discussed.

何元安

何元安，研究员，中国船舶工业系统工程研究院行业总师，中船集团学科带头人，军科委某委员会委员，装发部某专业组专家，科工局船舶行业专业组专家。《声学学报》、《隐身技术》、《体系工程》编委。长期从事舰艇隐身领域科研和教学工作，获多项部级科技进步奖，发表学术论文 80 余篇。作为项目总师，建成国内首座大型压力消声水罐综合测量装置，带领团队研制成功多型 XSW 装备产品。作为 973 项目技术首席，取得多项技术创新。作为中船集团智慧海洋工程首席专家，牵头完成了 1+1+N 的实施方案论证，积极推进区域示范，助力我国智慧海洋工程建设。

《以智慧海洋引领海洋信息技术创新发展》

摘　要：介绍了我国智慧海洋工程背景，针对海洋信息化的短板弱项，提出了我国智慧海洋工程的体系架构，积极打造基于海洋空间的基础信息平台、基于数字孪生的智能认知与管控平台、基于区块链的信息服务平台等三大信息平台，为打通我国海洋信息感知、传输、分析和智能应用的整体链路提供有效支撑，并结合应用案例进行了分析。

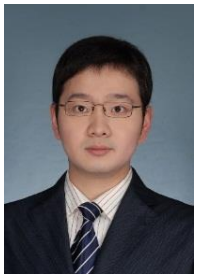
王方勇

王方勇，博士/高级工程师/硕士生导师，声纳技术重点实验室副主任。2010 年毕业于中国舰船研究院，毕业后一直于中船重工第七一五所、声纳技术重点实验室工作，长期从事水声信号处理技术研究，擅长主被动声纳目标识别方法研究，曾获省部级科技进步二等奖 1 项、三等奖 3 项，在美国声学杂志等国际期刊和国际会议发表学术论文 10 余篇。

《深度学习在水声信号处理中的应用研究》

摘　要：该报告主要分享了报告人所在研究团队近年来在基于人工智能的水声信号处理方面的研究进展及成效，具体包括将人工智能应用于水声信号处理的基本考虑、深度学习模型在水声信号处理应用中面临的问题和提出的解决办法、基于深度学习模型的水声目标识别初步研究进展、深度学习在水声信号处理中的应用展望等。

范　威



范威，博士，上海船舶电子设备研究所高级工程师。主要研究方向为水下小目标探测、水声对抗和水中目标特性。作为课题负责人或参与者参加国家自然科学基金、船舶重工联合基金、重点实验室基础课题等 10 余项，在声学学报等期刊和会议发表研究论文 10 篇，获发明专利 1 项。中国造船学会水中兵器学术委员会水中目标特性学组委员，上海市声学学会会员。

《水下小目标声 CT 成像技术》

摘　要：成像声纳装备在海底地形地貌测绘、水下搜救、海底管线检测、水下考古等方面发挥着重要作用，作用距离远、分辨力高、对比度大一直是水声成像技术的发展目标。本报告介绍声 CT 成像（计算层析成像）的基本原理，及其与多波束成像声纳、条带合成孔径成像声纳、侧扫声纳等水声成像体制的区别与联系，结合水下小目标成像试验数据处理结果，分析声 CT 成像体制的作用距离、分辨率、对比度等性能特性，　并探讨声 CT 成像技术在海洋信息领域的应用方向。

商志刚

商志刚，博士/高工，中国电子科学研究院水下信息室主任，2019 年度中央军委“青年托举”人才，北京理工大学校外硕士生导师，中国工程院蓝皮书“水声领域”特聘专家。曾获国家奖学金，黑龙江省优秀毕业生，黑龙江省勤工助学之星等荣誉。分别于 2010 年、2015 年于哈尔滨工程大学、中国科学院获工学学士、工学博士学位。曾主持或参与了中国电科装发联合基金、海军某型号、国防预研项目、中科院重大专项、国家自然科学基金等项目，累计发表学术论文 30 余篇，以第一发明人申请国家发明专利 20 余项，出版书籍 4 本，其中以第一作者出版技术专著《超导量子干涉技术及测磁应用》填补我国系统化介绍超导量子干涉技术在测磁应用方面的空白。担任 IEEE T-IMC、《信号处理》、《中国电子科学研究院学报》等学术期刊审稿人，曾受邀参加并担任第十二届全球智能控制与自动化会议“水下导航”专题分会场主席。

《空海跨域通信》

摘　要：美军近年来为巩固其全球霸权，提出了多域作战、全域作战、马赛克战等相关作战理念，意图推动构筑全域指控、全域攻防的联合作战体系，形成联合作战能力。海上作战是全域作战的重要组成部分，信息由空向海，遭遇物理瓶颈，依赖当前网信体系构建的作战体系，无法完成对全域作战资源的有效集成。目前，我国在研或已应用的通信网络系统，主要解决了陆、空、天、海上等作战域的通信问题，但在空海跨域方面研究较少，空海跨域通信是全域网信体系的重要短板技术之一。本报告从空海跨域通信的概念、国内外发展、典型系统及相关技术探索等几个方面进行了简要介绍，对海洋网络信息体系的建设将有一定启发作用。

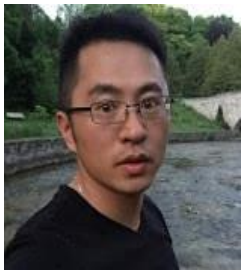
范寒柏

范寒柏， 副教授，华北电力大学（保定校区） 电子与通信工程系，长期从事电子技术教学工作，主要进行电子技术应用研究，关注海洋物理参数的测量。多年来，参与涉海项目国家“863”子课题一项。主持多项涉海项目。在各类期刊和会议上发表论文十余篇。 本人主要所研制的 XCTD、XBT、自容式 CTD、自容式海洋测温仪等海洋仪器已经批量生产。

《温盐深仪技术（CTD）与国产化现状》

摘　要：分析了温盐深（CTD）技术中的主要性能指标，介绍了电导率测量中的主要方法：电磁式电导率测量和电极式电导率测量方法，比较了两种方式的优点、缺点。阐述了电导率测量的关键技术。介绍了温盐深测量仪的使用特点，阐述了目前温盐深测量仪的国产化状况和难点。

李　波



李波，副教授，于 2008 年、2010 年、2015 年在哈尔滨工业大学获得电子信息工程本科学位、信息与通信工程硕士学位、控制科学与工程博士学位。另于 2013 年在加拿大麦克马斯特大学获得电气与计算机工程硕士学位。2015 年在加拿大麦克马斯特大学从事压缩感知研究工作。2016 年至 2017 年魁北克大学高等技术学院博士后。2017 年至 2019 年在加拿大 Nuance Communication 公司工作。2019 年至 2020 年在加拿大 Cerence Technology 任语言专家。研究兴趣包括阵列信号处理、压缩感知、机器学习等。

《非高斯噪声条件下波束形成技术研究》

摘　要：常规的波束形成算法通常假设噪声和干扰均为高斯分布，然而在实际工作环境中，噪声或干扰为非高斯分布。为了处理非高斯噪声或者干扰，本研究利用 p 范数达到优化波束权重的目的。本报告给出了非高斯条件下波束形成的优化问的题构建、最优解的寻找方法，以及机动干扰的处理等方面研究。

郭　晶

郭晶，讲师，2006 年取得哈尔滨工程大学硕士学位，2014 年国立台湾大学应用力学研究所访问学者，主要从事弹性波动理论、复合材料力学方面研究，以第一作者或通讯作者发表多篇 SCI 论文，主持国防科技创新基金项目 1 项，参与了多项军委科技委项目等纵向课题，主持完成多项横向课题。

《超磁致伸缩材料的无损检测与破坏分析》

摘　要：介绍超磁致伸缩材料的无损检测与破坏分析的研究背景、研究内容、研究目标等，主要围绕利用漏磁检测技术在超磁致伸缩材料中判断缺陷的类型和位置及其影响、含缺陷超磁致伸缩介质内 SH 波散射特性理论研究、通过 MATLAB 编程，得到基于解析解的超磁致伸缩介质中的数值解进行介绍。

王念滨

王念滨，教授/博导，1990 年毕业于哈尔滨船舶工程学院计算机科学与技术系计算机应用专业，2001 年硕博连读毕业于哈尔滨工业大学计算机科学与技术学院计算机应用专业。2001 任哈工大首创科技股份有限公司研究发展部部长，负责黑龙江、贵州省地税信息化建设项目，工商银行数据挖掘项目、国产数据库研究开发项目等。2005 年进入哈尔滨工程大学计算机学院，曾任黑龙江省 YOCSEF 论坛副主席，获国家自然科学基金项目三项、科工局基础科研项目二项。发表文章 50 多篇，授权专利 8 项，翻译出版学术专著 5 部。主要研究方向：大数据与人工智能。

《从隐身计算到机器意识-AI 海洋应用模式的探索与实践》

摘　要：从机器意识的研究意义出发，从三个方面讨论了隐身计算的研究工作。首先以构建水下“视界”信息基础为着眼点，重点探讨隐身要素及体系的构建方法；其次，分析当前深度学习技术的问题，在总结了开放动态环境应用工作的基础上，提出以隐身计算为基础，以健壮性为约束，构建隐身意识的手段和策略；第三，提出一种以强化学习为基础、快速智能识别为手段，构建全方位防御体系的方法和策略。

李丽洁

李丽洁，副教授/硕导。主要研究方向为社交网络、机器学习、视频图像处理。目前发表论文 20 余篇。主持国家自然科学青年基金项目 1 项、黑龙江省自然科学基金项目 1 项。

《多源水下目标探测与定位仿真集成平台技术初探》

摘　要：飞速发展的海洋信息技术使得水下目标探测定位技术有了日益增长的迫切需求，本报告介绍多源水下目标探测与定位的重要性；介绍仿真集成平台的架构和技术；介绍哈尔滨工程大学大数据分析与智能实验室的组成和主要研究方向。

黄　玉

黄玉，博士/副教授/硕导。主要从事电动力学等课程教学和磁探测与磁导航定位的科学研究。共发表期刊学术论文 46 篇、会议论文 18 篇，其中第一作者或通信作者发表 SCI 收录的期刊论文 5 篇。共申请国家发明专利 27 项，授权 14 项，其中第一发明人申请的国家发明专利 17 项，授权 7 项；授权实用新型专利 1 项。获省部级科技奖励 2 项，省高校科技奖励 1 项。主持国家自然科学基金青年项目 1 项、中国博士后科学基金面上和特别资助项目各 1 项、黑龙江省自然科学基金面上项目 1 项、国防科工局稳定支持课题项目 1 项、黑龙江省博士后科研启动资助金项目 1 项；主持校级教改项目 3 项；作为主要研究人员参与国家自然科学基金项目（含重点项目 1 项）、国防科技创新特区 H863 计划、总装预研及海洋公益性行业科研专项等多项科研课题。

《基于三轴隧穿磁强计立体阵列的磁梯度张量线性测距定位方法》

摘　要：水下磁性目标探测与定位对于我国领海安全守卫、海洋权益维护等都具有重要战略价值和科学意义。报告围绕一种磁梯度张量线性测距定位方法所涉及的研究背景与方法理论等展开，着重介绍磁梯度张量定位的近期实验结果、基于阵列面心点磁梯度张量的测距线性定位及磁矩反演算法理论、无需磁场模的三轴磁通门磁强计标定方法以及基于三维亥姆霍兹线圈磁场最优编排的三轴隧穿磁强计阵列标定方法等，期望推动水下运动目标的远距离定位方法与技术的进步。

王秋滢

王秋滢，副教授。主要从事水下组合导航、惯性导航等方向的研究工作。主持国家自然科学基金 2 项、省部级等其它项目 13 项，累计发表论文 60 余篇，授权中国发明专利 13 项，获得黑龙江省科学技术进步奖三等奖 2 项，出版专著、译著各 1 部。

《惯性组合导航技术研究》

摘　要：惯性导航作为一种全自主导航系统常用于海洋各平台领域，工作方式包括独立自主导航与组合导航两种。其中，基于惯性系统的组合导航是利用不同导航传感器的特性，通过数据融合实现“优势互补”，提高系统导航精度。报告介绍本人近年来在惯性组合导航方向的研究进展，包括船用惯性/星敏感器、惯性/计程仪组合导航技术、惯性行人定位技术等。

宿　南

宿南，副教授、硕士生导师。主要研究遥感图像目标检测、三维重建等方向。主持国家自然科学青年基金、中国博士后基金等项目。

《基于多平台光学遥感图像的海洋信息智能监测》

摘　要：介绍团队在海洋遥感信息智能监测方向的研究规划和进展情况，具体介绍海洋遥感监测的背景以及遥感图像飞机、舰船目标检测、目标型号识别、三维重建等技术内容，包括深度学习理论在遥感图像几个相关研究方向的发展，主要针对遥感图像中多尺度、多角度的特殊问题，和实际项目遇到的问题，分享一些团队现有工作的解决思路和方案。

凌焕章

凌焕章，副教授/应用数学研究中心副主任，主要研究方向为数据与军事智能、系统工程建模等，近年来与中国电子科技集团公司相关研究所针对数据军事情报、武器装备评估、军事热点问题建模等展开深入合作研究，取得了一系列相关研究成果和工程项目经验，对武器装备评估和验证具有一套成熟的体系流程，对指标贡献率“溯源”具有创新性的研究成果，主持中国电子科技集团课题 3 项，中央高校专项基金 2 项，参加国家自然科学基金面上基金 1 项，青年基金 3 项，参与其它各类项目研究十余项，在国内外学术刊物和重要学术会议上发表论文 12 篇，对本项目的研究开展有深厚的工作基础。

《武器装备评估技术与军事智能分析应用》

摘　要：科学技术的发展,不仅改善了军事装备的性能,也使装备本身复杂化，装备的评估与验证作为系统的一种固有设计特性,需要在系统全寿命周期的整个过程中,特别是方案论证与研制阶段,与系统性能、保障性、安全性、经济性、生产性等全面分析,权衡优化。现代化武器装备系统评估是一项复杂的系统工程问题，具有复杂性、动态性、依赖性等构件化系统的典型特征，这些特征为作战系统可靠性评估模型的研究提出了更大的挑战。另一方面人工智能正重新定义决策和反应能力，军事智能化正成为继机械化、信息化之后推动新一轮军事变革的强大动力，深刻影响着未来作战制胜机理、作战规则及作战方式方法等，日益推动战争步入智能化时代，本次报告结合以往研究所实际项目经历探讨武器装备评估验证技术与军事智能分析的应用。

张军海

张军海, 副教授，多年来一直从事激光抽运原子磁力仪、原子钟的相关技术和应用研究。主持或参与国家自然基金、科技部国际合作项目、国防 863 项目、国家航空基金等项目十余项，在 APL、IEEE、CPL 等杂志发表 SCI、EI 论文二十余篇。

《高精度量子矢量磁力仪的研究》

摘　要：本报告简要介绍量子磁力仪的工作原理、分类及应用领域。分析各类原子磁力仪的特点，以及我们小组研制的铯（Cs）量子矢量磁力仪进展。.

苑勇贵

苑勇贵, 哈尔滨工程大学物理与光电工程学院副教授，主要从事激光干涉测量原理与关键技术以及光纤白光干涉测试关键技术的研究工作。主持国家自然基金面上项目 2 项、青年基金 1 项，承担国家重大仪器设备开发专项、国家重点研发计划等国家级项目 6 项。

《光纤海底地震计关键技术研究》

摘　要：高性能海底地震观测技术是海洋地震观测研究的前提和基础，报告将从光纤地震传感单元关键技术、高精度信号解调关键技术、水下环境适应性关键技术等三方面汇报光纤海底地震计的研究工作及进展。

曲　嘉

曲嘉，副教授，2010 年取得哈尔滨工程大学力学博士学位，2015 年美国普渡大学航空航天学院访问学者，于主要从事强度理论、固体实验力学和冲击动力学方面研究，主持国家自然科学基金 2 项、黑龙江省自然科学基金 1 项、教育部博士学科点基金、国防科技工业基础研究等纵向项目，主持完成横向课题多项。

《水下爆炸模拟加载实验技术》

摘　要：简介飞片活塞式水下爆炸模拟加载装置的研究进展和评价、杆式活塞水下爆炸模拟加载装置及圆管式水听器结构抗水下爆炸的结构设计、实验与仿真的研究方案。

徐　博

徐博，副教授/博导。主要从事现代舰船及水下运载器导航理论研究、建模仿真以及试验工作。坚持础研究、预先研究和工程研制相结合，将多项研究成果转化为我国舰船导航系统实用化装备。获军队科技进步二等奖 1 项，黑龙江省科技进步二等奖 1 项，中国专利奖 1 项。注重理论与工程实践相结合，发表 SCI/EI 检索论文 30 篇。获国家发明专利授权 11 项，出版国防著作 2 部。

《基于声学通信与测距的水下多 AUV 协同定位优化方法研究》

摘　要：随着海洋开发与探测的不断深入，单一自主水下航行器（AUV）在执行复杂任务时显得力不从心。在综合考虑作业成本与作业质量等因素后，AUV 协同作业受到广泛认可。多 AUV 协同定位技术是高质量完成协同任务的基础和保证，而水下环境复杂多变，各种异常情况的出现往往是不可预测的，这不可避免地会对系统定位精度以及任务的执行产生消极影响。报告主要围绕如何削弱对定位精度的影响问题展开了相关研究。

蔡魁杰

蔡魁杰, 讲师，本科毕业于吉林大学数学学院，毕业后任哈工程大学数学院讲师。2019 年博士毕业于哈工大应用数学专业，研究方向是石油勘探信号处理。石油勘探信号处理方向发表 SCI 一、二区论文各一篇。在中科院上海神经所访问期间从事过计算神经研究工作，发表 EI 论文两篇。现研究方向包括地震信号处理、水声信号智能处理及反问题、压缩感知与稀疏表示、小样本机器学习等。

《石油勘探与海洋声层析中的优化问题与正则化方法》

摘　要：报告将首先针对石油勘探信号处理中的经典问题，介绍稀疏表示方法、正则化方法等数学方法在特征提取、信号去噪、相干信号分离等方向的应用。然后将结合海洋声层析问题，讨论从数学角度研究水声反演经典问题时可能提出的新思路。结合以上问题讨论理工结合的互补优势，以及数学工作者面对实际工程问题时可能需要做出的科研思路和导向的转变。.

冯国峰

冯国峰, 副教授/数学科学学院基础数学中心副主任，从 1999 年开始，一直从事应用数学的教学科研工作，主要从事数学物理方程反问题及其数值解法、最优化理论与方法的研究工作，先后参与完成了国家自然科学基金 5 项，省部级基金项目 2 项，目前参与的在研国家自然科学基金 1 项；在国内外学术刊物和重要学术会议上发表论文 11 篇，其中 SCI 检索 3 篇。并且担任黑龙江省工业与应用数学学会理事。

《波动方程反问题及其反演方法研究》

摘　要：波动方程反演是地球物理反问题的重要分支，在地震勘探、无损探伤、医疗诊断中有着广泛的应用，本报告主要分析了波动方程反演的背景和难点，构造了单尺度反演方法和多尺度反演方法，并且展望了反演方法的进一步发展方向。

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魏　浩

魏浩, 教授/博导，哈尔滨工程大学海洋先进材料研究院院长，主要从事声学材料、特种功能材料研究，所研制的一系列军工产品已经在海洋装备上使用，显著提高了装备使用性能。目前是中央军委装备发展部专业组成员、国家基金委、国防科工局项目评审专家。承担完成国家重大科研项目 30 余项，国际权威期科发表文章 40 余篇、申请专利 30 余项。获得省部级一等奖 2 项。

《海洋轻质声学复合材料》

摘　要：各类高性能设备在海洋装备上广泛安装使用大幅提升海洋装备的使用性能的同时，也导致振动噪声频率变宽、强度提升、振动形式复杂等问题，严重影响设备的使用性能。海洋声波复合材料可降低结构的抑制振动辐射噪声、流激噪声，尤其是中高航速下流激噪声问题；利用复合材料的轻质高强特点，实现设备重量大幅降低，解决重量问题，降低设备的重心稳心，提高装备的机动性和操控安全性；有效的降低船体流体阻力，提高装备的速度；具有优异的耐海洋腐蚀性能，降低全寿期维修成本，提高服役周期。

哈尔滨工程大学水声工程学院招聘启示

哈尔滨工程大学，起源于哈军工。隶属于工业和信息化部，是“国防七子”之一。是首批“211”工程重点建设高校、“985 工程”优势学科创新平台建设高校，现入选国家“双一流”建设高校。


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除哈尔滨校本部外，我正围绕国家重大发展战略，结合自身“三海一核”办学特色，着力建设青岛创新发展基地、烟台研究（生）院、海南创新发展基地、深圳研究院。

作为以“三海一核”为特色的高校，哈尔滨工程大学正迎来建校以来最大的历史机遇期。

水声工程学院是世界上规模最大的水声工程教学基地，是我国培养高水平水声技术人才的摇篮，是水声技术新理论、新技术、新方法的重要源头。

国家级平台：水声技术国防科技重点实验室（首批）、水声工程国家级实验教学示范中心、水声工程国家重点学科（首批）。


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学科专业需求：海洋科学，水声工程，声学，信息与通信工程，数学，海洋物理，导航与定位，传感器，大数据，人工智能等相关学科专业方向。

学历层次：博士研究生

相关待遇：学校待遇（年薪、绩效、安家费、购房补贴等）+学院待遇（不低于 40 万科研启动经费）+团队待遇（科研酬金等）。

学院网址：http://uae.hrbeu.edu.cn/

简历投递：ssxy@hrbeu.edu.cn

招聘时间：长期有效

联系人：　汪生泉 老师

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